

Table 1.2-1**Summary Statistics for Contaminants Potentially Posing Unacceptable Risks in Surface and Subsurface Sediment, Study Area (RM 1.9-11.8)**

Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Conventional (mg/kg)							
Ammonia							
Surface Sediment	459	99	0.07 U	481	98	87	220
Subsurface Sediment	215	100	1.4	775	210	200	460
Sulfide							
Surface Sediment	462	87	0.07 UJ	1830 J	26	4.7 JV	65 JV
Subsurface Sediment	208	85	0.4 UJ	796 J	25	6.1 JV	110 JV
Cyanide (Total)							
Surface Sediment	38	87	0.08 UJ	39.4 J	3.9	0.40 JV	20
Subsurface Sediment	125	73	0.03 J	1410	21	0.25 J	24
Perchlorate							
Surface Sediment	11	27	0.022 UJ	274	58	0.011 UT	270
Subsurface Sediment	NA	NA	NA	NA	NA	NA	NA
Metals (mg/kg)							
Aluminum							
Surface Sediment	1190	100	1630	47400	23000	24000	40000
Subsurface Sediment	1037	100	5730	45900	23000	24000	36000
Antimony							
Surface Sediment	1306	74	0.02 J	47.7	1.1	0.20 JV	5.4 UV
Subsurface Sediment	1189	71	0.02 J	55.1	0.69	0.17 JT	2.5 JV
Arsenic							
Surface Sediment	1476	92	0.7	132	4.7	3.6 JV	8.9
Subsurface Sediment	1492	96	0.5 J	51.4	4.0	3.5 JV	7.1
Barium							
Surface Sediment	232	100	58.9 J	5950	200	180	240
Subsurface Sediment	129	100	45.3	637	170	160	250
Beryllium							
Surface Sediment	233	86	0.22 U	1.31	0.59	0.60 T	0.70
Subsurface Sediment	89	91	0.279	1.05 U	0.51	0.52	0.70
Cadmium							
Surface Sediment	1476	90	0.00159 U	10.1	0.39	0.25 JV	1.2
Subsurface Sediment	1469	94	0.008 UJ	43.7	0.40	0.26 T	0.84 JV
Chromium							
Surface Sediment	1461	100	4.07 J	819 J	35	30 J	58 JV
Subsurface Sediment	1469	100	6.41 J	464	29	27	46 JV
Cobalt							
Surface Sediment	145	100	11.1 T	55.5	18	18 J	20
Subsurface Sediment	37	100	16.2	24.6	18	18 T	21

Table 1.2-1**Summary Statistics for Contaminants Potentially Posing Unacceptable Risks in Surface and Subsurface Sediment, Study Area (RM 1.9-11.8)**

Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Copper							
Surface Sediment	1477	100	6.19 J	2830	61	39 J	170
Subsurface Sediment	1481	100	9.42 J	3290	56	36 J	110
Hexavalent Chromium							
Surface Sediment	60	45	0.1 UJT	2.1 J	0.43	0.30 JV	1.4 JV
Subsurface Sediment	39	13	0.2 JT	0.3 J	0.12	0.10 UJ	0.21
Iron							
Surface Sediment	164	100	19100	84900	42000	42000	53000
Subsurface Sediment	81	100	18900	53900	36000	36000	46000
Lead							
Surface Sediment	1500	99	1.1 J	13400 T	50	16 JV	120 JV
Subsurface Sediment	1536	99	1.54	3330 J	47	20	130
Magnesium							
Surface Sediment	145	100	3710	14500	6700	6900	7700
Subsurface Sediment	88	100	2280 J	8510	5500	5800	7600
Manganese							
Surface Sediment	281	100	236 T	2220	670	660	1000
Subsurface Sediment	136	100	206	2330	570	530 JV	880
Mercury							
Surface Sediment	1452	92	0.00189 U	65.2 T	0.13	0.063 JV	0.25
Subsurface Sediment	1395	94	0.004 J	16.8	0.18	0.083 T	0.53
Nickel							
Surface Sediment	1438	99	6.22 J	594	26	23 JV	38
Subsurface Sediment	1462	100	5.99 J	716	26	24 JV	33 JV
Potassium							
Surface Sediment	145	100	540	50000	1700	1300	1600
Subsurface Sediment	88	93	321 J	1550	890	840	1400
Selenium							
Surface Sediment	1148	45	0.03 J	20	1.4	0.12 JV	12
Subsurface Sediment	1056	39	0.02 J	14	0.47	0.065 JV	1.1
Silver							
Surface Sediment	1438	93	0.014 J	14.8	0.35	0.21 JV	1.1
Subsurface Sediment	1456	93	5.8E-05 U	4.32 J	0.32	0.25 JV	0.88
Sodium							
Surface Sediment	145	100	352	49000	1800	1100	2400
Subsurface Sediment	88	100	167 J	57800 J	1400	610 JV	1300 JV
Thallium							
Surface Sediment	251	73	0.031 J	27	5.9	3.0 U	22
Subsurface Sediment	89	69	0.041	12	2.0	0.34 UT	8.2

Table 1.2-1**Summary Statistics for Contaminants Potentially Posing Unacceptable Risks in Surface and Subsurface Sediment, Study Area (RM 1.9-11.8)**

Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Vanadium							
Surface Sediment	145	100	63	152	100	100	120
Subsurface Sediment	37	100	89.9	136	100	100	110
Zinc							
Surface Sediment	1506	100	3.68 J	4220	150	110 JV	380
Subsurface Sediment	1521	100	24	9000	150	110 JV	340
Butyltins (µg/kg)							
Monobutyltin							
Surface Sediment	310	68	0.042 U	740 J	10	1.8 JV	31
Subsurface Sediment	332	53	0.034 U	540 J	7.5	0.50 JV	18
Tributyltin ion							
Surface Sediment	342	94	0.079 U	47000	450	17 JV	710
Subsurface Sediment	397	54	0 U	90000	790	1.5 J	1300
PCBs (µg/kg)							
Total PCBs (congeners or Aroclors) ^a							
Surface Sediment	1228	79	1 UT	35000 T	200	29	710
Subsurface Sediment	1447	62	0.0097 UT	150000 UT	300	33	630
Total PCBs (TEQ) - mammalian WHO 2005 TEFs ^a							
Surface Sediment	331	85	3.9E-06 UT	0.22 T	0.0040	0.00046 JT	0.016
Subsurface Sediment	153	95	4.2E-05 JT	0.35 JT	0.010	0.0017 JT	0.021
PCDD/Fs (µg/kg)							
1,2,3,4,7,8-HxCDF							
Surface Sediment	251	90	0.000016 U	84	1.41	0.0012	0.52
Subsurface Sediment	316	76	0.00000399 U	69.6	0.61	0.00082	0.54
1,2,3,7,8-PeCDD							
Surface Sediment	252	58	0.000008 U	0.020536	0.000756	1.16E-04	0.00413
Subsurface Sediment	316	49	4.0E-06 U	0.058293	0.000855	0.0000838	0.00225
2,3,4,7,8-PeCDF							
Surface Sediment	252	79	6.0E-06 U	28	0.35	0.00037	0.13
Subsurface Sediment	316	69	3.0E-06 U	24.1	0.20	0.00024	0.17
2,3,7,8-TCDF							
Surface Sediment	251	66	0.000011 U	37	0.51	0.00037	0.24
Subsurface Sediment	316	55	3.2E-06 U	21.4	0.25	0.00029	0.22
2,3,7,8-TCDD ^e							
Surface Sediment	222	21	4.1E-06 U	0.111091	0.00072	0.000022 UV	0.0010
Subsurface Sediment	251	29	2E-06 U	0.0836 JT	0.00090	0.000028 UV	0.0021
Total PCDD/Fs ^a							
Surface Sediment	222	100	0.0037 JT	200 JT	1.9	0.32 JTV	3.6 JTV
Subsurface Sediment	251	93	0.00035 JT	210 T	2.9	0.24 JT	6.4

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Portland Harbor Superfund Site

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Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
TCDD TEQ - mammalian WHO 2005 TEFs ^a							
Surface Sediment	222	100	2.9E-05 JT	14 JT	0.071	0.0015 JTV	0.039 JTV
Subsurface Sediment	251	93	4E-06 UT	9.67 JT	0.082	0.0012 JT	0.049
PBDEs (µg/kg)							
Total PBDEs ^c							
Surface Sediment	86	87	2.15 J	18.9	5.12	4.77	13.9
Subsurface Sediment	0						
Organochlorine Pesticides (µg/kg)							
2,4'-DDD							
Surface Sediment	1047	65	0.0272 U	710	7.9	0.95 J	25 JV
Subsurface Sediment	1115	57	0.0277 U	19300 NJ	55	1.1 NJ	54
4,4'-DDD							
Surface Sediment	1179	83	0.041 U	11000	36	1.9 J	77
Subsurface Sediment	1298	75	0.0415 U	690000	1900	2.5 JV	230
4,4'-DDE							
Surface Sediment	1176	82	0.027 U	2240 J	14	2.0 NJV	32
Subsurface Sediment	1298	65	0.027 U	24000	61	2.4 JV	46
4,4'-DDT							
Surface Sediment	1165	69	0.0478 U	81000	180	1.3 J	140 JV
Subsurface Sediment	1279	59	0.049 UJ	3500000	5500	1.5 NJ	270
Total of 2,4' and 4,4'-DDD (Sum DDD) ^a							
Surface Sediment	1179	85	0.041 UT	11000 T	43	1.3 NJT	2.5 AJT
Subsurface Sediment	1298	77	0.0415 UT	690000 T	1900	0.65 JV	3.2
Total of 2,4' and 4,4'-DDE (Sum DDE) ^a							
Surface Sediment	1176	82	0.038 UT	2530 JNT	16	1.3 NJT	2.2
Subsurface Sediment	1298	68	0.0389 UT	24000 T	63	0.25 JV	2.4
Total of 2,4' and 4,4'-DDT (Sum DDT) ^a							
Surface Sediment	1178	75	0.0441 AUJ	81000 T	190	0.72 JV	1.7
Subsurface Sediment	1297	66	0.0427 AUT	3500000 T	5400	0.23 AT	1.8
Total of 2,4' and 4,4'-DDD, -DDE, -DDT ^a							
Surface Sediment	1179	91	0.054 UT	85000 T	240	3.7 AJT	7.0
Subsurface Sediment	1298	82	0.049 UJT	3600000 T	7400	1.4 JV	9.1
Aldrin							
Surface Sediment	1081	23	0.00333 J	691 J	2.0	0.18 U	5.0 JV
Subsurface Sediment	1102	12	0.0269 UJ	3800 U	9.8	0.11 JV	9.0 JV
cis-Chlordane							
Surface Sediment	1101	35	0.00955 J	203 J	1.5	0.17 J	4.9 JV
Subsurface Sediment	1103	24	0.0286 U	3800 UJ	7.0	0.17 J	14 JV

Table 1.2-1**Summary Statistics for Contaminants Potentially Posing Unacceptable Risks in Surface and Subsurface Sediment, Study Area (RM 1.9-11.8)**

Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Total Chlordanes a							
Surface Sediment	1103	66	0.0351 UT	700 UT	5.6	1.1 JNT	20 JV
Subsurface Sediment	1103	55	0.0359 UT	3800 UJT	19	1.2 JNT	51 JV
Dieldrin							
Surface Sediment	1121	21	0.00834 J	356 J	2.0	0.19 UJ	4.0 JV
Subsurface Sediment	1134	6	0.03 U	7500 U	7.9	0.17 UJV	5.0
Total Endosulfan a							
Surface Sediment	1115	29	0.027 JT	270 T	2.0	0.32 NJT	5.0
Subsurface Sediment	1076	21	0.0393 AUJ	38000 UT	27	0.32 JTV	10.0
Endrin							
Surface Sediment	882	9	0.00984 J	200 U	1.8	0.15 UV	7.5 JV
Subsurface Sediment	870	14	0.0367 U	22000 U	24	0.18 JV	20
Endrin ketone							
Surface Sediment	1101	17	0.00208 UT	200 U	1.6	0.18 U	5.0 JV
Subsurface Sediment	1053	11	0.0253 U	7500 UJ	9.6	0.13 U	8.5
Heptachlor							
Surface Sediment	1126	6	0.00141 U	99 U	0.80	0.095 UJV	1.8 JV
Subsurface Sediment	1145	5	0.0262 U	3800 U	5.4	0.10 UJ	4.5 UV
Heptachlor Epoxide							
Surface Sediment	1114	8	0.00189 J	360 U	1.1	0.11 UJV	2.9
Subsurface Sediment	1086	11	0.0341 U	3800 U	6.0	0.15 UJV	5.5 JV
beta-Hexachlorocyclohexane							
Surface Sediment	1115	38	0.00112 U	99 U	1.8	0.55 U	6.6
Subsurface Sediment	1076	31	0.0291 U	3800 U	7.0	0.49 JV	9.5
delta-Hexachlorocyclohexane							
Surface Sediment	1112	13	0.00116 U	99 U	0.87	0.12 JV	2.2
Subsurface Sediment	1057	4	0.0615 UJ	3800 UJ	5.8	0.16 U	5.2
gamma-Hexachlorocyclohexane (γ -BHC, or Lindane)							
Surface Sediment	1126	18	0.0031 J	430	1.6	0.22 JV	5.7 NJV
Subsurface Sediment	1145	10	0.051 UT	3800 U	6.2	0.22 U	8.0 JV
MCPP							
Surface Sediment	200	1	0.115 UT	91000 U	900	0.89 UV	1800 UV
Subsurface Sediment	171	2	0.6 U	3100 U	28	0.82 UV	8.5
2,4,5-TP (Silvex)							
Surface Sediment	200	1	0.11 U	44 U	1.1	0.75 UJV	2.2 UV
Subsurface Sediment	182	1	0.45 U	21 U	1.5	0.63 UV	8.0 UV
2,4-Dichlorophenoxyacetic acid (2,4-D)							
Surface Sediment	245	4	0.0753 U	3250	11.0	1.36 U	26.5
Subsurface Sediment	170	3	0.31 U	473	2.3 U	0.41 U	0.6 U

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Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Polyyclic Aromatic Hydrocarbons (µg/kg)							
2-Methylnaphthalene							
Surface Sediment	1432	80	0.37 J	52000	210	9.5 JV	250
Subsurface Sediment	1582	79	0.3 J	3800000	13000	14 JV	2900
Acenaphthene							
Surface Sediment	1580	83	0.18 U	430000	1100	12 JV	1200 JV
Subsurface Sediment	1620	83	0.18 U	3900000	15000	23	13000
Acenaphthylene							
Surface Sediment	1580	76	0.27 J	54000	140	9.5 UV	230
Subsurface Sediment	1620	76	0.2 J	1500000 J	3100	10	1100 JV
Anthracene							
Surface Sediment	1580	87	0.24 U	390000	1000	22	1400 JV
Subsurface Sediment	1620	84	0.22 J	1310000	7600	27 JV	12000
Benzo(a)anthracene							
Surface Sediment	1580	95	0.5 J	320000	1500	74	4000
Subsurface Sediment	1620	89	0.17 J	772000	5300	67 JV	13000
Benzo(a)pyrene							
Surface Sediment	1580	95	0.24 U	340000	1800	85	4900
Subsurface Sediment	1620	88	0.14 UT	1010000	6400	79 JV	18000
Benzo(b)fluoranthene							
Surface Sediment	1474	96	0.72 U	300000	1500	94	4100
Subsurface Sediment	1620	88	0.19 J	850000	5000	79	14000
Benzo(b+k)fluoranthene							
Surface Sediment	482	90	3.8 T	108000 T	2600	210 TV	12000 TV
Subsurface Sediment	433	85	0.21 T	157000 T	2400	93 TV	13000
Benzo(g,h,i)perylene							
Surface Sediment	1580	93	0.5 J	180000	1200	65 JV	3700
Subsurface Sediment	1619	88	0.15 J	730000	4500	64	14000
Benzo(k)fluoranthene							
Surface Sediment	1442	95	0.36 U	100000	800	43	2900
Subsurface Sediment	1620	85	0.15 UT	540000	2600	42	8400
Chrysene							
Surface Sediment	1580	96	0.45 U	370000	1700	100 JV	4500 JV
Subsurface Sediment	1620	88	0.17 J	980000	6100	93 JV	16000
Dibenz(a,h)anthracene							
Surface Sediment	1580	82	0.22 J	25000	200	12 JV	670 JV
Subsurface Sediment	1620	76	0.22 J	88000	580	11 JV	1900
Fluoranthene							
Surface Sediment	1588	98	0.8 J	1200000	4000	180 JV	10000
Subsurface Sediment	1620	90	0.24 J	3500000	20000	180 JV	44000

Table 1.2-1**Summary Statistics for Contaminants Potentially Posing Unacceptable Risks in Surface and Subsurface Sediment, Study Area (RM 1.9-11.8)**

Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Fluorene							
Surface Sediment	1580	83	0.21 U	220000	610	11 JV	830
Subsurface Sediment	1620	82	0.21 U	1500000	7600	19	7900
Ideno(1,2,3-cd) pyrene							
Surface Sediment	1580	93	0.26 U	210000	1300	63	3800
Subsurface Sediment	1620	86	0.16 UT	610000	4100	60	12000
Naphthalene							
Surface Sediment	1518	71	0.27 J	73000 J	310	16 JV	370 UV
Subsurface Sediment	1499	78	0.27 J	20000000	61000	32 J	2000 U
Phenanthrene							
Surface Sediment	1580	95	0.53 J	1700000	4000	86	5600 JV
Subsurface Sediment	1620	90	0.24 J	8500000	42000	130 JV	54000
Pyrene							
Surface Sediment	1580	98	0.54 U	1300000	4400	180	10000
Subsurface Sediment	1620	91	0.15 J	4700000	25000	200 JV	48000
Total HPAHs a							
Surface Sediment	1580	99	3.9 JT	4300000 T	18000	970 JTV	49000 JV
Subsurface Sediment	1620	94	0.53 UT	13000000 T	79000	930 JV	190000 TV
Total LPAHs a							
Surface Sediment	1580	95	1.55 UJT	2900000 T	7300	190 JV	10000 JT
Subsurface Sediment	1620	93	0.39 UT	40000000 T	140000	280 JTV	99000 TV
Total PAHs a							
Surface Sediment	3160	99	6.3 JT	7300000 T	26000	340 JV	1000 JV
Subsurface Sediment	3240	96	0.7 UT	53000000 T	220000	200 JTV	1100 TV
Total Carcinogenic PAHs a							
Surface Sediment	1580	97	0.42 JT	450000 T	2400	130 TV	7000 TV
Subsurface Sediment	1620	92	0.26 JT	1300000 T	8400	110 JTV	25000 TV
Phthalates (µg/kg)							
Bis(2-ethylhexyl) phthalate							
Surface Sediment	1438	61	2 U	440000 J	750	93 JV	1700
Subsurface Sediment	1496	40	2 U	40000 U	230	40 JV	770
Butylbenzyl phthalate							
Surface Sediment	1429	31	1.6 U	10000 U	46	9.5 JT	160
Subsurface Sediment	1494	17	1.7 U	11800	48	6.5 JV	110
Dibutyl phthalate (Di-n-butyl phthalate)							
Surface Sediment	1428	33	2.9 U	20000 U	71	10 JV	140 UJV
Subsurface Sediment	1496	24	3 U	20000 U	67	9.9 JV	130

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Portland Harbor Superfund Site

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Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Diethyl phthalate							
Surface Sediment	1425	11	1.3 U	10000 U	32	5.0 UJ	100
Subsurface Sediment	1488	7	1.3 J	8800 U	48	5.5 JV	150 UT
Semivolatile Organic Compounds (µg/kg)							
Benzyl Alcohol							
Surface Sediment	1288	13	2.1 U	6600 U	34	7.5 JV	110 UJV
Subsurface Sediment	1232	13	2.1 UT	11700 U	99	6.5 JV	280
Carbazole							
Surface Sediment	1220	59	1.3 U	32000	160	8.3 JV	290 JV
Subsurface Sediment	1109	54	0.6 J	520000	2300	6.9 JV	1200
Dibenzofuran							
Surface Sediment	1416	77	0.19 U	31000	110	7.8 UJV	250
Subsurface Sediment	1383	76	0 U	230000	1200	9.2	1900
1,2-Dichlorobenzene							
Surface Sediment	139	2	0.092 U	322 UJ	22	0.50 UV	140
Subsurface Sediment	1135	2	1.5 U	3720 U	27	2.1	60
1,4-Dichlorobenzene							
Surface Sediment	311	1	0.14 U	322 U	10	0.13 UT	110 UJV
Subsurface Sediment	793	6	2.1 U	4800 U	36	3.4 UJ	75
Hexachlorobenzene							
Surface Sediment	1266	32	0.0122 J	10000 UJ	20	1.3 JV	13 JV
Subsurface Sediment	1270	17	0.0162 U	14000	45	1.1 JV	77
Phenols (µg/kg)							
4-Methylphenol							
Surface Sediment	1309	49	1.5 U	10000 U	84	14 J	460
Subsurface Sediment	1159	54	1.5 UT	7300 U	68	19 J	210
Phenol							
Surface Sediment	1340	29	2 U	10000 U	36	10 JV	100 UJV
Subsurface Sediment	1287	24	2 U	7100	58	9.0 J	160 UV
Pentachlorophenol							
Surface Sediment	238	39	0.2 U	72 U	4.0	1.2 JV	11 UJV
Subsurface Sediment	274	49	0.18 U	1300 U	12	1.9 JV	15
Volatile Organic Compounds (µg/kg)							
1,1-Dichloroethene							
Surface Sediment	290	0	0.08 U	322 U	11	0.085 UJV	120
Subsurface Sediment	570	0	0.069 U	8400 U	40	0.075 UV	57
1,2-Dichloroethane							
Surface Sediment	290	1	0.038 U	322 U	11	0.032	120
Subsurface Sediment	570	1	0.035 U	8000 U	39	0.029 UV	55

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Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
1,2-Dichloropropane							
Surface Sediment	290	0	0.043 U	322 U	11	0.036 UJV	120
Subsurface Sediment	559	0	0.04 U	8700 U	37	0.032 U	55
1,1,2-Trichloroethane							
Surface Sediment	290	0	0.072 U	322 U	11	0.060 UV	120
Subsurface Sediment	560	0	0.067 U	7000 U	34	0.055 UV	76 UV
1,2,4-Trimethylbenzene							
Surface Sediment	47	2	2 UJ	322 U	73	50 U	150 UV
Subsurface Sediment	96	18	0.18 U	13100	480	15 UJV	1900
1,3,5-Trimethylbenzene							
Surface Sediment	47	0	2 UJ	322 U	71	50 U	150 UV
Subsurface Sediment	96	16	0.077 U	7530 U	210	8.9 UV	760
Acrolein							
Surface Sediment	40	0	0.7 U	560 U	38	0.60 UV	130 UV
Subsurface Sediment	94	2	0.63 U	89000 UJ	1200	65 UJV	7700
Benzene							
Surface Sediment	346	12	0.01 U	720 J	13	0.048 UV	99
Subsurface Sediment	599	32	0.01 U	270000	1600	0.12 J	290
Bromochloromethane							
Surface Sediment	290	0	0.073 U	322 U	11	0.065 UJV	120
Subsurface Sediment	559	0	0.068 U	8900 U	34	0.055 U	55 U
Bromodichloromethane							
Surface Sediment	290	0	0.051 U	322 U	11	0.070 UJV	120
Subsurface Sediment	559	0	0.047 U	6000 U	26	0.060 U	37
Carbon disulfide							
Surface Sediment	287	9	0.085 U	3220 U	99	0.14 UJ	1200 UV
Subsurface Sediment	559	21	0.069 U	12000 U	49	0.13 U	76
Chlorobenzene							
Surface Sediment	299	16	0.072 U	35000	300	0.075 UJ	130
Subsurface Sediment	570	10	0.062 U	80000	240	0.065 UV	86
Chloroethane							
Surface Sediment	293	0	0.26 U	500 U	14	0.28 UJ	130
Subsurface Sediment	559	0	0.24 U	13000 U	45	0.24 U	64
Chloroform							
Surface Sediment	290	4	0.068 U	322 U	11	0.060 UJV	120
Subsurface Sediment	570	4	0.063 U	6700 U	36	0.055 UV	64
cis-1,2-Dichloroethene							
Surface Sediment	121	2	0.076 U	322 U	24	0.085 U	140 UV
Subsurface Sediment	204	4	0.12 U	2300 U	45	5.3 UV	170

Table 1.2-1**Summary Statistics for Contaminants Potentially Posing Unacceptable Risks in Surface and Subsurface Sediment, Study Area (RM 1.9-11.8)**

Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Ethylbenzene							
Surface Sediment	362	9	0.009 U	322 U	11	0.085 UV	62 UJV
Subsurface Sediment	589	19	0.009 U	140000	1400	0.065 U	1600
Isopropylbenzene							
Surface Sediment	293	14	0.054 U	643 U	23	0.055 U	250
Subsurface Sediment	563	26	0.05 U	19000 J	180	0.080 U	450 JV
Methylene chloride							
Surface Sediment	290	1	0.37 U	1610 U	52	0.90 JV	590
Subsurface Sediment	560	8	0.17 U	14000 U	100	1.8 UV	420 UV
MTBE							
Surface Sediment	270	4	0.048 U	322 U	9.8	0.040 UJV	120
Subsurface Sediment	555	16	0.044	5200	27	0.074 J	52
Tetrachloroethene							
Surface Sediment	337	1	0.11 U	322 U	9.6	0.11 UT	70
Subsurface Sediment	587	3	0.092 U	7700 U	43	0.085 U	82 UJV
Toluene							
Surface Sediment	337	5	0.02 U	3800	31	0.17 UT	120
Subsurface Sediment	589	20	0.01 U	190000	710	0.15 U	200 JV
trans-1,2-Dichloroethene							
Surface Sediment	287	0	0.075 U	322 U	10	0.19 U	120
Subsurface Sediment	559	0	0.068 U	9800 U	37	0.17 U	60 U
Trichloroethene							
Surface Sediment	337	2	0.076 U	322 U	9.6	0.070 UT	70
Subsurface Sediment	587	17	0.07 U	1900000	3800	0.090 U	80 UJV
Vinyl chloride							
Surface Sediment	290	1	0.11 U	500 U	13	0.090 UJV	130
Subsurface Sediment	571	2	0.096 U	15000 U	62	0.080 U	84
m,p-Xylene							
Surface Sediment	337	8	0.02 U	643 U	18	0.15 U	140
Subsurface Sediment	589	19	0.02 U	200000	1100	0.12 U	700 JV
o-Xylene							
Surface Sediment	337	12	0.008 U	322 U	9.9	0.090 UJT	100
Subsurface Sediment	589	25	0.008 U	80000	560	0.14 J	670 UV
Total xylenes a							
Surface Sediment	337	12	0.02 UT	643 UT	19	0.16 UT	210
Subsurface Sediment	589	28	0.02 UT	280000 T	1700	0.23 UT	1300 UTV
Petroleum (TPH) (mg/kg)							
Diesel-Range Hydrocarbons							
Surface Sediment	807	92	0.046 J	20000 J			JV
Subsurface Sediment	1087	81	0.045 J	190000 J	1100	130 J	2000 JV

Table 1.2-1**Summary Statistics for Contaminants Potentially Posing Unacceptable Risks in Surface and Subsurface Sediment, Study Area (RM 1.9-11.8)**

Portland Harbor Superfund Site

Portland, Oregon

Analyte	# Analyzed	% Detected					
			Minimum (Full DL)	Maximum (Full DL)	Mean (Half DL)	Median (Half DL)	95th Percentile (Half DL)
Gasoline-Range Hydrocarbons							
Surface Sediment	429	14	0.02 U	140 J	4.4	1.3 UJ	19 JV
Subsurface Sediment	817	27	0.02 U	21000 J	89	1.7 J	54
Residual-Range Hydrocarbons							
Surface Sediment	645	96	0.29	18000 J	630	400 J	1500 JV
Subsurface Sediment	999	84	0.1 U	110000 J	990	430 JT	2400 JT
Total Petroleum Hydrocarbons							
Surface Sediment	836	94	0.35 JT	33000 JT	810	500 JTV	1900
Subsurface Sediment	1185	82	0.1 UT	320000 JT	2100	500 JT	4500 JTV
Total Petroleum Hydrocarbons (TPH) C10-C12 Aliphatic							
Surface Sediment	5	0	3 U	3.5 UJ	1.68 U	1.75 U	b
Subsurface Sediment	16	63	2.4 U	80 J	12	4.5	b

Notes

When a statistic matched more than one sample, preference was given to qualifiers in the following order: A, J, N, T, V, No Flag, U.

Duplicates not included

a - Calculated U = 1/2 DL

b - Insufficient data points for statistic

c -Polybrominated diphenyl ethers (PBDE) calculated as the sum of PBDE 47, PBDE 99, PBDE 100, PBDE 153, PBDE 154, and PBDE 183. Nondetects calculate as U = 1/2 DL

Total PCBs are total PCB congeners whenever available and total Aroclors if not (on a per sample basis). NA - Not Analyzed

DL - Detection Limit ND - non-detect

PAH - polycyclic aromatic hydrocarbon PCB - polychlorinated biphenyl

RM - river mile

TEQ - toxic equivalent concentration

Reason codes for qualifiers:

A - Total value based on limited number of analytes.

J - The associated numerical value is an estimated quantity.

T - The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte).

Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for Round 2 data. U - The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.

V - Median or 95th percentile obtained through interpolation.

N -The identity of the analyte is presumptive and not definitive, generally as a result of the presence in the sample of an analytical interference, such as hydrocarbons or, in the case of pesticides, PCBs. Data that are N-qualified meet the primary identification criteria of the method; however, the confirmation criteria are not met and the identification is potentially a false positive.

Table 1.2-2
Chemicals Potentially Posing Unacceptable Risks for Human Health
Portland Harbor Superfund Site
Portland, Oregon

Chemical of Concern	Human Health Risk Assessment Summary																Shellfish														
	Beach Sediment				Surface Water				In-Water Sediment				Fish Tissue				Shellfish														
	Recreational Beach User	Dockside Worker	Low-Frequency Fisher	High-Frequency Fisher	Tribal Fisher	Transients	Ingestion of Human Milk (Dockside Worker)	Recreational Beach User	Transients	Diver in Wet Suit	Diver in Dry Suit	Potential Future Domestic Water Use	In-Water Worker	Low Frequency Fisher	High Frequency Fisher	Tribal Fisher	Diver in Wet Suit	Diver in Dry Suit	Ingestion of Human Milk (In-Water Worker)	Ingestion of Human Milk (Low Frequency Fisher)	Ingestion of Human Milk (High Frequency Fisher)	Ingestion of Human Milk (Tribal Fisher)	Ingestion of Human Milk (Diver in Wet Suit)	Fish Consumption, River Mile Basis	Fish Consumption, Study Area-Wide	Tribal Fish Consumption	Ingestion of Human Milk (Non-tribal Consumption)	Ingestion of Human Milk (Tribal Consumption)	Adult Consumption	Ingestion of Human Milk (Non-tribal Consumption)	
Metals																															
Antimony																															
Arsenic	X ^b		X ^b	X ^b	O							X		X ^{ab}	X ^b								O	O	#		O				
Chromium, hexavalent												X ^a																			
Lead ^d																											X				
Mercury																										+	+	+			
PAHs																															
Benzo(a)anthracene	X ^{ab}	X ^{ab}										O		X ^{ab}	X ^{ab}	X ^{ab}	X ^{ab}							X ^{ab}			O				
Benzo(a)pyrene	O ^b	O ^a		X ^{ab}	X ^b							X ^{ab}		#	X ^{ab}	O ^b	O ^b	O	O ^b	X ^{ab}				O	X ^c	X	#				
Benzo(b)fluoranthene	X ^{ab}	X ^{ab}										O		X ^{ab}	X ^{ab}	X ^{ab}	X ^{ab}									O					
Benzo(k)fluoranthene																											X ^a				
Dibenzo(a,h)anthracene	X ^b	X ^{ab}										O		X ^{ab}	X ^{ab}	X ^{ab}	X ^{ab}									O					
Indeno(1,2,3-cd)pyrene	X ^{ab}	X ^{ab}										O		X ^{ab}	X ^{ab}	X ^{ab}	X ^{ab}									X					
Total Carcinogenic PAHs	O	O ^a	X ^{ab}	X ^{ab}	X ^b							X ^{ab}	X ^{ab}	#	X ^{ab}	O ^b	O ^b	#	O ^b	X ^{ab}				O	X	X	#				
Phthalates																															
Bis(2-ethylhexyl)phthalate																											O				
SVOCs																															
Hexachlorobenzene																											O	O			
Phenols																															
Pentachlorophenol																												X ^a			
Polychlorinated Biphenyls																															
Total PCBs														X ^{ab}	X ^{ab}	O ^b	X ^{ab}				+ ^{ab}	+ ^{ab}	+ ^{ab}		#	#	#	+	+	#	+
Total PCB TEQ														X ^{ab}	X ^{ab}	X ^b	X ^{ab}								O	#	#	+ ^b	+	O	+ ^b
Dioxin/Furan																															
Total Dioxin TEQ														O ^{ab}	O ^{ab}	O ^{ab}	#	O ^{ab}	X ^{ab}	+ ^{ab}	+ ^{ab}	+ ^{ab}	+ ^{ab}		#	#	#	+	+	#	+ ^b
Pesticides																															
Aldrin																												X ^a			
Dieldrin																												X			
Total Chlordane																												X ^c	X		

Table 1.2-2
Chemicals Potentially Posing Unacceptable Risks for Human Health
Portland Harbor Superfund Site
Portland, Oregon

Chemical of Concern	Human Health Risk Assessment Summary												In-Water Sediment			Fish Tissue			Shellfish										
	Beach Sediment			Surface Water			In-Water Sediment			Fish Tissue			In-Water Sediment			Fish Tissue			Shellfish										
Chemical of Concern	Recreational Beach User	Dockside Worker	Low-Frequency Fisher	High-Frequency Fisher	Tribal Fisher	Transients	Recreational Beach User	Transients	Diver in Wet Suit	Diver in Dry Suit	Potential Future Domestic Water Use	In-Water Worker	Low Frequency Fisher	High Frequency Fisher	Tribal Fisher	Diver in Wet Suit	Diver in Dry Suit	Ingestion of Human Milk (In-Water Worker)	Ingestion of Human Milk (Low Frequency Fisher)	Ingestion of Human Milk (High Frequency Fisher)	Ingestion of Human Milk (Tribal Fisher)	Ingestion of Human Milk (Diver in Wet Suit)	Fish Consumption, River Mile Basis	Fish Consumption, Study Area-Wide	Tribal Fish Consumption	Ingestion of Human Milk (Non-tribal Consumption)	Ingestion of Human Milk (Tribal Consumption)	Adult Consumption	Ingestion of Human Milk (Non-tribal Consumption)
Total DDD																													
Total DDE																													
Total DDT																													
Total DDX																													
Herbicides																													
MCPP																													
Polybrominated Diphenyl Ethers																													

Notes:

Groundwater seep exposure resulted in no cancer or noncancer exceedances of target risk levels.

Abbreviations:

- X Chemical exceeds cancer risk of 10^{-6} or a hazard quotient of 1 for at least one BHHRA scenario.
- O Chemical exceeds cancer risk of 10^{-5} or a hazard quotient of 1 for at least one BHHRA scenario.
- # Chemical exceeds cancer risk of 10^{-4} or a hazard quotient of 1 for at least one BHHRA scenario.
- + Chemical exceeds a hazard quotient of 1 for at least one BHHRA scenario, but does not exceed a cancer risk of 10^{-6} .
- a Status is result of target risk or hazard exceedance for two or fewer exposure points.
- b Status is result of target risk or hazard exceedance for RME scenario only.
- c Status is result of target risk or hazard exceedance only for subsistence fish consumption.
- d Status for lead is based on results of predicted blood lead levels.

Shading indicates an exceedance of a hazard quotient of 1 for at least one BHHRA scenario.

Table 1.2-3
COPCs Posing Potentially Unacceptable Ecological Risks within the Portland Harbor Study Area
Portland Harbor Superfund Site
Portland, Oregon

Assessment Endpoint	Exposure Pathway	COPCs with HQ ≥ 1.0	Additional Details in the BERA
Aquatic plants, amphibians	Surface water	Benzo(a)anthracene, benzo(a)pyrene, BEHP, naphthalene, total DDX, total PCBs, ^a zinc	Sections 9-1 (amphibians) and 10-1 (aquatic plants)
	TZW	1,2,4-Trimethylbenzene, 1,2-dichlorobenzene, 2-methylnaphthalene, 4,4'-DDT, acenaphthene, anthracene, barium, benzo(a)anthracene, benzo(a)pyrene, cadmium, carbon disulfide, chlorobenzene, chloroethane, chloroform, copper, cyanide, ethylbenzene, fluorene, gasoline fraction (aliphatic) C4 – C6, gasoline fraction (aliphatic) C10 – C12, iron, isopropylbenzene, lead, magnesium, manganese, naphthalene, nickel, perchlorate, phenanthrene, potassium, sodium, toluene, total DDX, zinc	Sections 9-2 (amphibians) and 10-1 (aquatic plants)
Benthic invertebrates, bivalves, decapods	Sediment	2,4'-DDD, 2-methylnaphthalene, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, 4-methylphenol, acenaphthene, acenaphthylene, ammonia, ^b anthracene, Aroclor 1254 ^c , arsenic ^c , benzo(a)anthracene, benzo(a)pyrene, ^c benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, benzyl alcohol, cadmium, carbazole, chlordane (cis and trans), ^c chromium, chrysene, cis-chlordane, copper, dibenzo(a,h)anthracene, dibenzofuran, dibutyl phthalate, dieldrin, diesel-range petroleum hydrocarbons, endrin, endrin ketone, fluoranthene, fluorene, gasoline-range hydrocarbons, ^d heptachlor epoxide, ^c indeno(1,2,3-cd)pyrene, lead, lindane (γ -HCH), ^c mercury, naphthalene, ^c nickel, ^c phenanthrene, phenol, pyrene, residual-range hydrocarbons, ^e silver, sulfide, ^b sum DDD, sum DDE, sum DDT, total chlordane, ^c total DDX, total endosulfan, total HPAH, total LPAH, total PCBs, TBT, zinc, ^c β -HCH, δ -HCH	Sections 6-2 and 6-3
	Surface water	4,4'-DDT, ^a benzo(a)anthracene, benzo(a)pyrene, BEHP, ethylbenzene, naphthalene, total DDX, total PCBs, ^a trichloroethene, zinc	Section 6-5
	TZW	1,1-Dichloroethene, 1,2,4-trimethylbenzene, 1,2-dichlorobenzene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, 2-methylnaphthalene, 4,4'-DDT, acenaphthene, anthracene, barium, benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, beryllium, cadmium, carbon disulfide, chlorobenzene, chloroethane, chloroform, chrysene, cis-1,2-dichloroethene, cobalt, copper, cyanide, dibenzo(a,h)anthracene, dibenzofuran, ethylbenzene, fluoranthene, fluorene, gasoline fraction (aliphatic) C4 – C6, gasoline fraction (aliphatic) C6 – C8, gasoline fraction (aliphatic) C10 – C12, gasoline fraction (aromatic) C8 – C10, indeno(1,2,3-cd)pyrene, iron, isopropylbenzene, lead, m,p-xylene, magnesium, manganese, naphthalene, nickel, o-xylene, perchlorate, phenanthrene, potassium, pyrene, sodium, toluene, total DDX, total xylenes, trichloroethene, vanadium, zinc	Section 6-6
Fish	Tissue	4,4'-DDD, arsenic, BEHP, copper, total DDX, total PCBs, TBT, zinc	Section 6-4
	Surface water	4,4'-DDT, ^a benzo(a)anthracene, benzo(a)pyrene, BEHP, ethylbenzene, naphthalene, total DDX, total PCBs, ^a trichloroethene, zinc	Section 7-3
	TZW	1,1-Dichloroethene, 1,2,4-trimethylbenzene, 1,2-dichlorobenzene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, 2-methylnaphthalene, 4,4'-DDT, acenaphthene, anthracene, barium, benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene.	Section 7-4

Table 1.2-3
COPCs Posing Potentially Unacceptable Ecological Risks within the Portland Harbor Study Area
Portland Harbor Superfund Site
Portland, Oregon

Assessment Endpoint	Exposure Pathway	COPCs with HQ ≥ 1.0	Additional Details
		beryllium, cadmium, carbon disulfide, chlorobenzene, chloroethane, chloroform, chrysene, cis-1,2-dichloroethene, cobalt, copper, cyanide, dibenzo(a,h)anthracene, dibenzofuran, ethylbenzene, fluoranthene, fluorene, gasoline fraction (aliphatic) C4 – C6, gasoline fraction (aliphatic) C6 – C8, gasoline fraction (aliphatic) C10 – C12, gasoline fraction (aromatic) C8 – C10, indeno(1,2,3-cd)pyrene, iron, isopropylbenzene, lead, m,p-xylene, magnesium, manganese, naphthalene, nickel, o-xylene, perchlorate, phenanthrene, potassium, pyrene, sodium, toluene, total DDx, total xylenes, trichloroethene, vanadium, zinc	
	Fish tissue	Antimony, BEHP, copper, lead, total DDx, total PCBs	Section 7-1
	Diet	Cadmium, copper, mercury, TBT	Section 7-2
Birds	Diet	Aldrin, benzo(a)pyrene, copper, dibutyl phthalate, lead, sum DDE, total DDx, total dioxin/furan TEQ, total PCBs, total PCB TEQ, total TEQ	Section 8-1
	Bird egg tissue	Total dioxin/furan TEQ, total PCBs, total PCB TEQ, total TEQ	Section 8-2
Mammals	Diet	Aluminum, lead, total dioxin/furan TEQ, total PCBs, total PCB TEQ, total TEQ	Section 8-1

^a Identified as a COPC (HQ ≥ 1.0) when the AWQC TRV was adopted; not identified as a COPC (HQ < 1.0) when the alternative TRV was adopted. These chemicals are not included in the total counts of COPCs with potentially unacceptable ecological risk unless they were identified as a COPC for another LOE.

^b Ammonia and sulfide in bulk sediment exceeded SLs but are not included in the total counts of COPCs with potentially unacceptable ecological risk.

^c Identified as a COPC based on concentrations that exceeded the sediment PEC and/or PEL [see Section 6.3]; chemical was not identified as a COPC based on the FPM or LRM predicted toxicity LOE. These chemicals are not included in the total counts of COPCs with potentially unacceptable ecological risk unless they were identified as a COPC for another LOE (e.g., arsenic is identified as a COPC with potentially unacceptable risk for benthic invertebrates based on the tissue LOE and is therefore included in the total count of COPCs).

^d Identified as a COPC based on concentrations that exceeded the TPH SQG (i.e., the chemical was not identified as a COPC for any other benthic sediment evaluation).

^e Identified as a COPC based on concentrations that exceeded the TPH SQG; chemical was not included in the COPC counts if identified as a COPC based only on the TPH SQG exceedance.

AWQC – ambient water quality criteria

HQ – hazard quotient

SQG – sediment quality guideline

BEHP – bis(2-ethylhexyl) phthalate

LOE – line of evidence

TBT – tributyltin

COPC – chemical of potential concern

LPAH – low-molecular-weight polycyclic aromatic hydrocarbon

TEQ – toxic equivalent

DDD – dichlorodiphenyldichloroethane

total DDx – sum of all six DDT isomers

DDE – dichlorodiphenyldichloroethylene

(2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT and 4,4'-DDT)

DDT – dichlorodiphenyltrichloroethane

TPH – total petroleum hydrocarbons

FPM – floating percentile model

TRV – toxicity reference value

HCH – hexachlorocyclohexane

TZW – transition zone water

HPAH – high-molecular-weight polycyclic aromatic hydrocarbon

PEC – probable effects concentration

PEL – probable effects level

SL – screening level

Table 1.2-4**Chemicals Identified as Most Likely to be Contaminants of Ecological Significance**

Portland Harbor Superfund Site

Portland, Oregon

Contaminants of Primary Ecological Significance	
PCBs	Dioxins and furans
PAHs	DDT and its metabolites
Additional Contaminants of Ecological Significance	
Total chlordanes	Lead
Copper	Zinc
Lindane (γ -HCH)	Tributyltin
Perchlorate	Mercury
Cadmium	BEHP
Dieldrin	Cyanide
Ethylbenzene	C ₁₀ – C ₁₂ TPH
Manganese	Vanadium

Table 1.2-5**Locations and Media with Highest PCBs Concentrations**

Portland Harbor Superfund Site

Portland, Oregon

Location	Sediment	Sediment Traps	Surface Water	Biota
RM 2E	X		X	X
International Slip (RM 4E)	X	NA	X	X
Willamette Cove (RM 7E)	X	X	X	X
Swan Island Lagoon (RM 8E)	X	X	X	X
RM 11E	X	X	X	X
RM 9W	X	X	X	X

Table 1.2-6**Locations and Media with Highest Dioxin/Furan Concentrations**

Portland Harbor Superfund Site

Portland, Oregon

Location	Sediment	Sediment Traps	Surface Water	Pore Water	Biota
International Slip (RM 4E)	X	X	X	NA	X
Willamette Cove (RM 7E)	X		X	NA	X
Swan Island Lagoon (RM 8E)	X	X	X	NA	X
RM 7W	X	X	X	X	X
RM 9W	X	X	X	NA	X

Table 1.2-7**Locations and media with highest DDx concentrations**

Portland Harbor Superfund Site

Portland, Oregon

Location	Sediment	Sediment Traps	Surface Water	Pore Water	Biota
RM 11E	X	X		NA	
RM7W	X	X	X	X	X
RM9W	X	X	X	NA	X

Table 1.2-8**Locations and Media with Highest PAH**

Portland Harbor Superfund Site

Portland, Oregon

Location	Sediment	Sediment Traps	Surface Water	Pore Water	Biota
International Slip (RM 4E)	X	X		NA	X
Swan Island Lagoon (RM 8E)	X	X	X	NA	NA
RM 3W-6W	X			X	X
RM 6W	X	X	X	X	X
RM 9W	X		X	NA	X